SDA FOREST SERVICE
ESEARCH PAPER **NC-191**

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Manuscript approved for publication February 19, 1980

1980

SUMMARY OF GREEN WEIGHTS AND VOLUMES FOR FIVE TREE SPECIES IN MICHIGAN

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In the past few years more and more small, whole trees, and the residue remaining from conventional logging operations have been converted to chips for fiber or fuel. As fossil fuels become scarcer, chipping trees and logging debris in the woods will probably become a common way to harvest much of this material which was previously considered unmerchantable. So, foresters and loggers increasingly need to estimate the weight of trees, boles, and logging residue.

Studies made in the western part of the Upper Peninsula of Michigan in 1970 (Steinhilb and Erickson 1970), 1972 (Steinhilb and Erickson 1972), and 1976 (Steinhilb and Winsauer 1976) produced estimating equations, tables, and graphs for the weights and cubic foot volumes of trees, boles, and residue for aspen, spruce, balsam fir, red pine, and sugar maple. This information is summarized here in a condensed and more usable form.

Definitions: the "total tree" is the entire tree above the stump, while the "bole" is the delimbed stem cut at a point 3 inches in diameter outside the bark for all species except sugar maple, where the top diameter of the bole was 4 inches outside the bark. "Residue" is all remaining portions of the tree except the stump and roots, including tops, limbs, and foliage.

In the original studies, field data were obtained from 97 aspen, 71 balsam fir, 58 white spruce, 58 red pine and 58 pulpwood-sized and 79 saw log-sized sugar maple trees.

FIELD PROCEDURES

Each tree was numbered and its d.b.h. recorded to the nearest 0.1 inch and felled carefully to minimize breakage and loss of limbs. Each tree was weighed within 24 hours of felling.

All limbs were severed and the main stem lopped at its 3-inch-diameter point outside the bark (d.o.b.) except for sugar maple which was severed at 4-inch d.o.b. Taper measurements were taken on each stem outside the bark at the stump cut, at 2 feet and 4 feet above the stump and every 8 feet thereafter to the point of lopping. Total length of the tree and the bole were also measured to the nearest foot.

ANALYTIC PROCEDURE

A standard form of estimating equation for all five species was felt desirable. The equations used in the sugar maple study (Steinhilb and Winsauer 1976) were chosen because of their simplicity and the general availability of the independent variables from timber inventory.

Cubic foot volume was calculated for the whole tree and its residue from the tree weight and pound per cubic foot figures. Regression equations were developed for each species. Several other regression models were also tested to insure that the common form chosen was sufficiently accurate for all species.

RESULTS AND DISCUSSIONS

The variance in weight and volume measurements increased as the diameter of the trees increased, at a rate of approximately $(\text{d.b.h.})^4$. Therefore, the final equations were obtained from weighted regressions with a weighting factor of $(1/\text{d.b.h.})^4$ to compensate for the nonhomogenity of weights and volumes of trees, boles, and residue.

The saw log size (12 inches d.b.h. or larger) sugar maple trees were included in the analyses of tree weights and volumes but could not be used for the bole and residue equations because their bole length had been defined differently.

The similarity of the tree weight curves (Young 1976) would suggest the possibility of creating a set of general curves to predict green tree weight of any species. It also seems to imply that if d.b.h. is known, a practical estimate of green tree weight can be obtained regardless of species. Although a larger variation appears in the residue weight curves, these also indicate the possibility of a set of general curves.

GRAPHS AND EQUATIONS

	Table		Figure	
Subject	**No.**	**Page**	**No.**	**Page**
Tree weight vs. d.b.h. and tree height	1-5	3-7	1-5	14-15
Tree volume vs. d.b.h. and tree height	1-5	3-7	6-10	15-16
Bole weight vs. d.b.h. and bole length	6-10	8-12	11-15	16-17
Bole volume vs. d.b.h. and bole length	6-10	8-12	16-20	17-18
Residue weight vs. d.b.h.	11	13	21-25	19-20
Residue volume vs. d.b.h.	11	13	26-30	20-22

Tables of tree weights and volumes with 95 percent confidence limits on the mean for each species are presented in tables 1-5. Tables of bole weights and volumes with 95 percent confidence limits on the mean are presented in tables 6-10. Residue weights and volumes for all five species are presented in table 11.

Two additional graphs are included— one for tree weight for all five species based on d.b.h. (fig. 31) and one containing all five residue weight curves (fig. 32).

LITERATURE CITED

Steinhilb, H. M., and John R. Erickson. 1970. Weights and centers of gravity for quaking aspen trees and boles. U.S. Department of Agriculture Forest Service, Research Note NC-91, 4 p. U.S. Department of Agriculture Forest Service, North Central Forest Experiment Station, St. Paul, Minnesota.

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Table 1.— *Aspen tree weight and tree volume (95 percent confidence limit on the mean)*

	Tree length (feet)											
	30		40		50		60		70		80	
D.b.h.	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume
Inches	*Pounds*	*Feet*^{3}	*Pounds*	*Feet*^{3}	*Pounds*	*Feet*^{3}	*Pounds*	*Feet*^{3}	*Pounds*	*Feet*^{3}	*Pounds*	*Feet*^{3}
5	142.5	3.52	182.0	4.27	221.6	5.04	261.1	5.80	300.7	6.56	340.2	7.32
	(24.2)[1]	(.57)	(23.1)	(.61)	(22.0)	(.67)	(21.1)	(.74)	(20.2)	(.82)	(19.5)	(.91)
6	194.7	4.52	251.6	5.62	308.6	6.71	365.5	7.81	422.5	8.91	479.4	10.00
	(22.7)	(.63)	(21.3)	(.73)	(20.1)	(.84)	(19.1)	(.97)	(18.5)	(1.10)	(18.1)	(1.24)
7	256.4	5.71	333.9	7.20	411.4	8.69	488.9	10.18	566.4	11.67	643.9	13.17
	(21.2)	(.74)	(19.6)	(.90)	(18.6)	(1.07)	(18.1)	(1.26)	(18.3)	(1.46)	(19.1)	(1.66)
8	327.5	7.08	428.8	9.03	530.0	10.98	631.3	12.92	732.5	14.87	833.8	16.82
	(19.7)	(.88)	(18.4)	(1.12)	(18.1)	(1.37)	(19.0)	(1.63)	(20.7)	(1.89)	(23.3)	(2.16)
9	408.2	8.63	536.4	11.10	664.5	13.56	792.7	16.03	920.8	18.50	1,048.9	20.96
	(18.6)	(1.07)	(18.2)	(1.38)	(19.4)	(1.71)	(22.2)	(2.05)	(25.8)	(2.39)	(30.2)	(2.74)
10	498.4	10.37	656.6	13.41	814.8	16.46	973.0	19.50	1,131.2	22.55	1,289.4	25.59
	(18.1)	(1.29)	(19.3)	(1.69)	(22.7)	(2.11)	(27.5)	(2.53)	(33.1)	(2.96)	(39.2)	(3.39)
11	598.1	12.29	789.5	15.97	980.9	19.65	1,172.3	23.34	1,363.8	27.02	1,555.2	30.70
	(18.6)	(1.54)	(22.1)	(2.04)	(27.8)	(2.55)	(34.7)	(3.07)	(42.2)	(3.59)	(49.9)	(4.11)
12	707.2	14.39	935.0	18.77	1,162.8	23.16	1,390.6	27.54	1,618.5	31.93	1,846.3	36.31
	(20.2)	(1.83)	(26.3)	(2.43)	(34.3)	(3.05)	(43.2)	(3.66)	(52.6)	(4.28)	(62.1)	(4.91)
13	825.9	16.67	1,093.2	21.82	1,360.6	26.96	1,627.9	32.11	1,895.3	37.25	2,162.7	42.40
	(23.0)	(2.14)	(31.8)	(2.86)	(42.0)	(3.58)	(53.0)	(4.31)	(64.2)	(5.04)	(75.7)	(5.77)
14	954.0	19.14	1,264.1	26.10	1,574.2	31.07	1,884.2	37.04	2,194.3	43.01	2,504.4	48.98
	(26.9)	(2.48)	(38.2)	(3.32)	(50.7)	(4.16)	(63.7)	(5.01)	(77.0)	(5.86)	(90.4)	(6.71)
15	1,091.7	21.79	1,447.6	28.64	1,803.6	35.49	2,159.5	42.34	2,515.5	49.19	2,871.4	56.04
	(31.7)	(2.85)	(45.5)	(3.82)	(60.3)	(4.79)	(75.5)	(5.76)	(90.9)	(6.74)	(106.4)	(7.71)
16	1,238.8	24.62	1,643.8	32.41	2,048.8	40.21	2,453.8	48.00	2,858.7	55.80	3,263.7	63.59
	(37.2)	(3.25)	(53.6)	(4.35)	(70.8)	(5.46)	(88.2)	(6.57)	(105.8)	(7.68)	(123.6)	(8.79)
17	1,395.4	27.63	1,852.6	36.43	2,309.8	45.23	2,767.0	54.03	3,224.2	62.83	3,681.4	71.63
	(43.4)	(3.68)	(62.4)	(4.92)	(82.0)	(6.17)	(101.8)	(7.43)	(121.8)	(8.68)	(141.9)	(9.93)
18	1,561.5	30.83	2,074.1	40.70	2,586.6	50.56	3,099.2	60.43	3,611.8	70.29	4,124.3	80.16
	(50.2)	(4.13)	(71.8)	(5.53)	(94.0)	(6.93)	(116.4)	(8.34)	(138.8)	(9.74)	(161.4)	(11.15)

[1]The numbers in parentheses give a confidence interval on the mean.

Table 2.—*White spruce tree weight and tree volume (95 percent confidence limit on the mean).*

D.b.h.	Tree length (feet) 30		40		50		60		70	
	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume
Inches	*Pounds*	*Feet*^{3}	*Pounds*	*Feet*^{3}	*Pounds*	*Feet*^{3}	*Pounds*	*Feet*^{3}	*Pounds*	*Feet*^{3}
5	273.5	4.00	313.7	4.86	354.0	5.72	394.2	6.58	434.5	7.44
	(72.7)[1]	(1.10)	(69.2)	(1.05)	(65.8)	(1.00)	(62.7)	(.95)	(59.8)	(.91)
6	326.6	5.14	384.6	6.38	442.5	7.62	500.5	8.85	558.4	10.09
	(68.1)	(1.03)	(63.4)	(.96)	(59.2)	(.90)	(55.6)	(.84)	(52.6)	(.80)
7	389.4	6.48	468.3	8.17	547.2	9.85	626.1	11.54	705.0	13.23
	(63.1)	(.96)	(57.5)	(.87)	(53.2)	(.81)	(50.3)	(.76)	(49.1)	(.74)
8	461.8	8.03	564.9	10.23	667.9	12.43	771.0	14.64	874.0	16.84
	(57.9)	(.88)	(52.4)	(.79)	(49.4)	(.75)	(49.5)	(.75)	(52.7)	(.80)
9	544.0	9.78	674.4	12.57	804.8	15.36	935.2	18.15	1,065.6	20.94
	(53.3)	(.81)	(49.3)	(.75)	(50.2)	(.76)	(55.8)	(.85)	(64.9)	(.98)
10	635.7	11.75	796.7	15.19	957.7	18.63	1,118.7	22.07	1,279.7	25.51
	(50.0)	(.76)	(50.0)	(.75)	(57.2)	(.87)	(69.3)	(1.05)	(84.3)	(1.28)
11	737.2	13.91	932.0	18.08	1,126.8	22.24	1,321.6	26.41	1,516.4	30.57
	(49.1)	(.74)	(55.7)	(.84)	(70.0)	(1.06)	(88.4)	(1.34)	(108.9)	(1.65)
12	848.2	16.29	1,080.1	21.25	1,311.9	26.20	1,543.8	31.16	1,775.6	36.11
	(51.6)	(.78)	(66.1)	(1.00)	(87.5)	(1.32)	(111.9)	(1.69)	(137.7)	(2.09)
13	969.0	18.87	1,241.1	24.69	1,513.2	30.50	1,785.3	36.32	2,057.4	42.14
	(57.9)	(.88)	(80.5)	(1.22)	(108.6)	(1.64)	(138.8)	(2.10)	(170.1)	(2.58)
14	1,099.4	21.66	1,415.0	28.40	1,730.5	35.15	2,046.1	41.90	2,361.6	48.64
	(67.7)	(1.02)	(98.1)	(1.49)	(132.6)	(2.01)	(168.8)	(2.56)	(205.8)	(3.12)
15	1,239.5	24.65	1,601.7	32.40	1,964.0	40.14	2,326.2	47.89	2,688.5	55.63
	(80.3)	(1.22)	(118.3)	(1.79)	(159.3)	(2.41)	(201.6)	(3.05)	(244.5)	(3.70)
16	1,389.2	27.85	1,801.4	36.67	2,213.5	45.48	2,625.7	54.29	3,037.8	63.10
	(95.4)	(1.44)	(140.7)	(2.13)	(188.4)	(2.85)	(237.1)	(3.59)	(286.2)	(4.33)
17	1,548.6	31.26	2,013.9	41.21	2,479.2	51.16	2,944.5	61.10	3,409.8	71.05
	(112.4)	(1.70)	(165.1)	(2.50)	(219.7)	(3.33)	(275.0)	(4.16)	(330.8)	(5.01)
18	1,717.6	34.88	2,239.3	46.03	2,760.9	57.18	3,282.6	68.33	3,804.2	79.48
	(131.2)	(1.99)	(191.4)	(2.90)	(253.1)	(3.83)	(315.5)	(4.78)	(378.2)	(5.73)

[1]The numbers in parentheses give a confidence interval on the mean.

Table 3.— *Red pine tree weight and tree volume (95 percent confidence limit on the mean)*

D.b.h.	Tree length (feet) 40 Weight	40 Volume	50 Weight	50 Volume	60 Weight	60 Volume	70 Weight	70 Volume	80 Weight	80 Volume
Inches	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*
5	187.5	3.59	232.5	4.34	277.6	5.09	322.6	5.84	367.7	6.59
	(18.1)[1]	(.51)	(17.0)	(.53)	(16.0)	(.55)	(15.1)	(.58)	(14.2)	(.60)
6	266.8	4.91	331.6	5.99	396.5	7.08	461.4	8.16	526.3	9.24
	(16.3)	(.55)	(14.9)	(.58)	(13.8)	(.62)	(12.8)	(.65)	(12.2)	(.69)
7	360.5	6.47	448.8	7.95	537.1	9.42	625.4	10.90	713.7	12.37
	(14.4)	(.60)	(13.0)	(.65)	(12.1)	(.70)	(11.8)	(.74)	(12.2)	(.79)
8	468.6	8.28	583.9	10.20	699.3	12.13	814.6	14.05	929.9	15.98
	(12.7)	(.66)	(11.9)	(.72)	(12.1)	(.79)	(13.5)	(.85)	(15.6)	(.92)
9	591.1	10.32	737.1	12.76	883.1	15.20	1,029.0	17.63	1,175.0	20.07
	(11.9)	(.73)	(12.5)	(.81)	(14.6)	(.89)	(17.8)	(.97)	(21.5)	(1.05)
10	728.1	12.61	908.3	15.62	1,088.5	18.62	1,268.7	21.63	1,448.9	24.64
	(12.4)	(.80)	(15.1)	(.90)	(19.2)	(1.00)	(24.1)	(1.11)	(29.2)	(1.21)
11	879.5	15.14	1,097.5	18.77	1,315.5	22.41	1,533.6	26.05	1,751.6	29.69
	(14.6)	(.89)	(19.5)	(1.01)	(25.4)	(1.13)	(31.7)	(1.26)	(38.3)	(1.38)
12	1,045.2	17.90	1,304.7	22.23	1,564.2	26.56	1,823.7	30.89	2,083.2	35.22
	(18.2)	(.98)	(25.1)	(1.13)	(32.6)	(1.28)	(40.5)	(1.42)	(48.5)	(1.57)
13	1,225.4	20.91	1,530.0	25.99	1,834.5	31.07	2,139.1	36.15	2,443.6	41.24
	(22.9)	(1.08)	(31.6)	(1.26)	(40.8)	(1.43)	(50.2)	(1.61)	(59.8)	(1.78)
14	1,420.1	24.16	1,773.2	30.05	2,126.4	35.94	2,479.6	41.84	2,832.8	47.73
	(28.4)	(1.19)	(39.0)	(1.40)	(49.9)	(1.60)	(60.9)	(1.80)	(72.0)	(2.01)
15	1,629.1	27.64	2,034.5	34.41	2,440.0	41.18	2,845.4	47.94	3,250.9	54.71
	(34.6)	(1.31)	(47.0)	(1.55)	(59.7)	(1.78)	(72.4)	(2.01)	(85.3)	(2.25)
16	1,852.5	31.37	2,313.8	39.07	2,775.2	46.77	3,236.5	54.47	3,697.8	62.17
	(41.4)	(1.44)	(55.7)	(1.71)	(70.2)	(1.97)	(84.8)	(2.24)	(99.5)	(2.51)
17	2,090.4	35.34	2,611.2	44.03	3,132.0	52.72	3,652.7	61.41	4,173.5	70.10
	(48.7)	(1.58)	(65.0)	(1.88)	(81.5)	(2.18)	(98.1)	(2.48)	(114.6)	(2.78)
18	2,342.7	39.55	2,926.5	49.30	3,510.4	59.04	4,094.2	68.78	4,678.1	78.52
	(56.6)	(1.72)	(75.0)	(2.06)	(93.5)	(2.40)	(112.1)	(2.74)	(130.7)	(3.07)

[1]The numbers in parentheses give a confidence interval on the mean.

Table 4.—*Balsam fir tree weight and tree volume (95 percent confidence limit on the mean)*

	Tree length (feet)									
	30		40		50		60		70	
D.b.h.	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume
Inches	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*
5	202.7	3.79	245.7	4.64	288.7	5.48	331.7	6.32	374.7	7.17
	(47.4)[1]	(.40)	(44.2)	(.39)	(41.2)	(.38)	(38.4)	(.37)	(35.9)	(.37)
6	259.5	4.91	321.4	6.12	383.3	7.34	445.2	8.55	507.1	9.77
	(43.2)	(.39)	(39.0)	(.37)	(35.4)	(.36)	(32.5)	(.36)	(30.6)	(.35)
7	326.5	6.22	410.8	7.88	495.1	9.53	579.4	11.18	663.7	12.84
	(38.7)	(.37)	(34.0)	(.36)	(30.9)	(.35)	(29.7)	(.35)	(30.8)	(.35)
8	403.9	7.74	514.0	9.90	624.1	12.06	734.2	14.22	844.3	16.38
	(34.4)	(.36)	(30.4)	(.35)	(30.0)	(.35)	(33.3)	(.36)	(39.3)	(.38)
9	491.7	9.46	631.0	12.20	770.3	14.93	909.6	17.66	1,048.9	20.40
	(31.0)	(.35)	(30.1)	(.35)	(35.0)	(.37)	(43.7)	(.39)	(54.5)	(.43)
10	589.7	11.39	761.7	14.76	933.7	18.14	1,105.7	21.51	1,277.7	24.89
	(29.7)	(.35)	(34.6)	(.36)	(45.5)	(.40)	(59.2)	(.45)	(74.3)	(.51)
11	698.1	13.51	906.2	17.60	1,114.3	21.68	1,322.4	25.76	1,530.5	29.85
	(31.8)	(.36)	(43.5)	(.39)	(60.0)	(.45)	(78.3)	(.52)	(97.4)	(.61)
12	816.7	15.84	1,064.4	20.70	1,312.1	25.56	1,559.8	30.42	1,807.5	35.28
	(37.6)	(.37)	(55.8)	(.43)	(77.3)	(.52)	(100.1)	(.62)	(123.4)	(.73)
13	945.7	18.37	1,236.4	24.08	1,527.1	29.78	1,817.8	35.48	2,108.5	41.19
	(46.4)	(.40)	(70.6)	(.49)	(97.1)	(.61)	(124.4)	(.74)	(152.1)	(.87)
14	1,085.1	21.11	1,422.2	27.72	1,759.3	34.33	2,096.4	40.95	2,433.5	47.56
	(57.5)	(.44)	(87.4)	(.56)	(118.9)	(.71)	(151.0)	(.87)	(183.4)	(1.03)
15	1,234.7	24.04	1,621.7	31.63	2,008.7	39.23	2,395.7	46.82	2,782.7	54.41
	(70.4)	(.49)	(105.9)	(.65)	(142.6)	(.82)	(179.7)	(1.01)	(217.1)	(1.20)
16	1,394.7	27.18	1,835.0	35.82	2,275.3	44.46	2,715.6	53.10	3,155.9	61.74
	(84.8)	(.55)	(126.0)	(.74)	(168.1)	(.95)	(210.6)	(1.17)	(253.2)	(1.39)
17	1,564.9	30.53	2,062.0	40.27	2,559.1	50.03	3,056.2	59.78	3,553.3	69.53
	(100.6)	(.62)	(147.7)	(.85)	(195.5)	(1.09)	(243.6)	(1.34)	(291.8)	(1.59)
18	1,745.5	34.06	2,302.8	45.00	2,860.1	55.93	3,417.4	66.87	3,974.7	77.80
	(117.6)	(.70)	(170.8)	(.97)	(224.6)	(1.24)	(278.6)	(1.52)	(332.8)	(1.80)

[1]The numbers in parentheses give a confidence interval on the mean.

Table 5.—*Sugar maple tree weight and tree volume (95 percent confidence intervals on the mean)*

	Tree height (feet)											
	40		50		60		70		80		90	
D.b.h.	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume
Inches	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*
5	194.0	2.82	236.0	3.59	277.9	4.37	320.0	5.20	362.0	5.97	403.9	6.75
	(21.3)[1]	(.39)	(20.8)	(.37)	(20.3)	(.37)	(20.1)	(.37)	(19.8)	(.36)	(19.5)	(.36)
6	267.8	4.18	328.2	5.30	388.7	6.42	449.3	7.58	509.7	8.70	570.2	9.82
	(20.4)	(.37)	(19.8)	(.36)	(19.5)	(.36)	(19.4)	(.35)	(19.3)	(.35)	(19.3)	(.35)
7	355.1	5.80	437.3	7.31	519.5	8.83	601.8	10.35	684.3	11.92	766.6	13.44
	(19.7)	(.40)	(19.2)	(.34)	(19.0)	(.34)	(19.3)	(.35)	(19.9)	(.36)	(20.6)	(.38)
8	455.8	7.66	563.2	9.64	670.6	11.63	778.0	13.61	885.3	15.59	993.3	17.62
	(19.2)	(.35)	(19.1)	(.35)	(19.6)	(.36)	(20.6)	(.37)	(21.8)	(.39)	(23.85)	(.43)
9	569.9	9.76	705.8	12.28	841.7	14.79	977.6	17.30	1,113.6	19.81	1,250.2	22.37
	(19.1)	(.34)	(19.8)	(.36)	(21.3)	(.39)	(23.3)	(.42)	(25.8)	(.47)	(28.9)	(.53)
10	697.8	12.17	865.3	15.22	1,033.0	18.32	1,200.8	21.42	1,368.6	24.53	1,537.3	27.67
	(20.0)	(.36)	(21.6)	(.39)	(24.3)	(.44)	(27.5)	(.50)	(31.2)	(.57)	(35.7)	(.65)
11	838.8	14.78	1,041.4	18.48	1,244.4	22.23	1,447.5	25.98	1,650.5	29.73	1,854.6	33.53
	(21.5)	(.39)	(24.4)	(.44)	(28.4)	(.52)	(33.1)	(.60)	(38.1)	(.69)	(43.8)	(.80)
12	993.8	17.63	1,234.4	22.04	1,496.0	26.51	1,717.6	30.98	1,959.3	35.44	2,202.1	39.94
	(23.8)	(.43)	(28.3)	(.51)	(33.8)	(.61)	(39.8)	(.73)	(46.1)	(.83)	(53.1)	(.97)
13	1,161.2	20.73	1,444.1	25.92	1,727.7	31.16	2,011.3	36.40	2,294.9	41.64	2,578.4	46.88
	(27.0)	(.49)	(33.0)	(.60)	(40.0)	(.73)	(47.5)	(.86)	(55.1)	(1.00)	(62.9)	(1.14)
14	1,342.5	24.07	1,670.6	30.11	1,999.5	36.18	2,328.4	42.26	2,657.3	48.34	2,986.2	54.42
	(31.0)	(.56)	(38.5)	(.70)	(47.1)	(.85)	(56.0)	(1.02)	(65.1)	(1.18)	(74.3)	(1.35)
15	1,537.3	27.67	1,914.0	34.60	2,291.5	41.58	2,669.1	48.56	3,046.6	55.53	3,424.2	62.51
	(35.7)	(.65)	(44.9)	(.81)	(55.0)	(1.00)	(65.5)	(1.19)	(76.0)	(1.37)	(86.7)	(1.57)
16	1,745.5	31.51	2,175.3	39.45	2,603.6	47.35	3,033.2	55.29	3,462.8	63.22	3,892.3	71.16
	(40.9)	(.74)	(52.4)	(.95)	(63.6)	(1.16)	(75.7)	(1.38)	(87.8)	(1.59)	(100.0)	(1.81)
17	1,967.1	35.60	2,452.3	44.56	2,935.9	53.49	3,420.8	62.45	3,905.7	71.41	4,390.7	80.37
	(46.8)	(.85)	(60.0)	(1.09)	(72.9)	(1.32)	(86.6)	(1.57)	(100.4)	(1.82)	(114.3)	(2.07)
18	2,202.1	39.94	2,746.1	49.99	3,288.2	60.00	3,831.9	70.05	4,375.6	80.09	4,919.3	90.14
	(53.1)	(.97)	(68.2)	(1.24)	(82.8)	(1.51)	(98.3)	(1.79)	(113.9)	(2.06)	(129.5)	(2.35)
19	2,450.6	44.53	3,056.8	55.72	3,660.8	66.88	4,266.5	78.08	4,872.3	89.27	5,478.0	100.47
	(60.0)	(1.09)	(77.0)	(1.40)	(93.5)	(1.69)	(110.7)	(2.01)	(128.2)	(2.32)	(145.6)	(2.65)
20	2,712.6	49.37	3,384.2	61.77	4,053.4	74.14	4,724.6	86.54	5,395.8	98.95	6,067.0	111.35
	(67.3)	(1.22)	(86.3)	(1.57)	(104.6)	(1.90)	(123.9)	(2.24)	(143.2)	(2.60)	(162.6)	(2.95)
21	2,987.9	54.45	3,728.4	68.12	4,466.2	81.77	5,206.2	95.44	5,946.2	109.12	6,686.2	122.80
	(75.0)	(1.36)	(96.2)	(1.75)	(116.5)	(2.11)	(137.8)	(2.50)	(159.1)	(2.89)	(180.5)	(3.28)
22	3,276.7	59.78	4,089.3	74.78	4,899.1	89.77	5,711.3	104.78	6,523.4	119.79	7,335.6	134.80
	(83.2)	(1.51)	(106.6)	(1.94)	(128.9)	(2.34)	(152.5)	(2.77)	(175.8)	(3.19)	(199.3)	(3.62)
23	3,578.9	65.36	4,467.1	81.76	5,355.3	98.15	6,239.8	114.55	7,127.5	130.95	8,015.2	147.35
	(91.9)	(1.67)	(117.5)	(2.13)	(143.2)	(2.60)	(167.5)	(3.05)	(193.3)	(3.51)	(219.0)	(3.97)
24	3,894.6	71.19	4,861.7	89.04	5,828.8	106.90	6,791.9	124.75	7,758.4	142.61	8,725.0	160.47
	(101.0)	(1.83)	(128.9)	(2.34)	(157.0)	(2.85)	(183.5)	(3.33)	(211.5)	(3.84)	(239.6)	(4.35)

[1]The numbers in parentheses give a confidence interval on the mean.

Table 6.—*Aspen bole weight and bole volume (95 percent confidence limit on the mean)*

	Bole length (feet)									
	20		30		40		50		60	
D.b.h.	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume
Inches	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*
5	104.3	2.51	145.6	3.31	187.0	4.11	228.3	4.91	269.6	5.71
	(16.7)[1]	(.47)	(15.7)	(.47)	(14.9)	(.46)	(14.1)	(.45)	(13.5)	(.45)
6	140.7	3.21	200.2	4.37	259.7	5.52	319.2	6.67	378.7	7.82
	(15.8)	(.47)	(14.6)	(.46)	(13.6)	(.45)	(13.0)	(.45)	(12.7)	(.45)
7	183.7	4.05	264.7	5.61	345.7	7.18	426.7	8.74	507.7	10.31
	(14.9)	(.46)	(13.6)	(.45)	(12.8)	(.45)	(12.8)	(.45)	(13.6)	(.45)
8	233.3	5.00	339.0	7.05	444.8	9.09	550.6	11.14	656.4	13.19
	(14.0)	(.46)	(12.9)	(.45)	(12.9)	(.45)	(14.2)	(.46)	(16.4)	(.47)
9	289.5	6.09	423.3	8.68	557.2	11.27	691.1	13.86	825.0	16.44
	(13.3)	(.45)	(12.8)	(.45)	(14.3)	(.46)	(17.3)	(.48)	(21.1)	(.50)
10	352.3	7.31	517.6	10.50	682.9	13.70	848.2	16.89	1,013.5	20.09
	(12.8)	(.45)	(13.7)	(.46)	(17.1)	(.48)	(21.9)	(.51)	(27.3)	(.55)
11	421.7	8.65	621.7	12.51	821.7	16.38	1,021.7	20.25	1,221.7	24.11
	(12.8)	(.45)	(15.6)	(.47)	(21.0)	(.50)	(27.6)	(.56)	(34.6)	(.62)
12	497.7	10.12	735.8	14.72	973.8	19.32	1,211.8	23.92	1,449.9	28.52
	(13.4)	(.45)	(18.5)	(.48)	(25.9)	(.54)	(34.20)	(.62)	(42.8)	(.71)
13	580.4	11.72	859.7	17.12	1,139.1	22.52	1,418.5	27.92	1,697.8	33.32
	(14.8)	(.46)	(22.2)	(.51)	(31.6)	(.59)	(41.7)	(.70)	(52.0)	(.81)
14	669.6	13.44	993.6	19.70	1,317.6	25.97	1,641.6	32.23	1,965.6	38.50
	(16.8)	(.47)	(26.6)	(.55)	(38.0)	(.66)	(49.9)	(.79)	(62.0)	(.93)
15	765.5	15.29	1,137.4	22.48	1,509.4	29.68	1,881.3	36.87	2,253.2	44.06
	(19.4)	(.49)	(31.6)	(.59)	(45.0)	(.73)	(58.9)	(.89)	(72.9)	(1.06)
16	868.0	17.28	1,291.2	25.46	1,714.3	33.64	2,137.5	41.82	2,650.7	50.00
	(22.5)	(.51)	(37.1)	(.65)	(52.6)	(.82)	(68.5)	(1.01)	(84.6)	(1.21)
17	977.1	19.38	1,454.8	28.62	1,932.5	37.86	2,410.3	47.09	2,888.0	56.33
	(26.0)	(.54)	(43.0)	(.71)	(60.8)	(.92)	(78.9)	(1.14)	(97.0)	(1.37)
18	1,092.8	21.62	1,628.4	31.98	2,164.0	42.33	2,699.5	52.68	3,235.1	63.04
	(30.0)	(.58)	(49.4)	(.78)	(69.5)	(1.02)	(89.8)	(1.28)	(110.3)	(1.54)

[1]The numbers in parentheses give a confidence interval on the mean.

Table 7.—*White spruce bole weight and bole volume (95 percent confidence limit on the mean)*

D.b.h.	Bole length (feet) 20		30		40		50		60	
	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume
Inches	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*
5	196.3	2.85	228.8	3.55	261.3	4.24	293.8	4.94	326.4	5.64
	(45.4)[1]	(.29)	(43.0)	(.28)	(40.7)	(.26)	(38.5)	(.25)	(36.7)	(.24)
6	224.9	3.47	271.7	4.47	318.5	5.47	365.4	6.47	412.2	7.47
	(43.2)	(.28)	(40.0)	(.26)	(37.1)	(.24)	(34.7)	(.22)	(33.0)	(.21)
7	258.7	4.19	322.4	5.55	386.2	6.92	449.9	8.28	513.7	9.64
	(40.8)	(.26)	(36.9)	(.24)	(33.9)	(.22)	(32.1)	(.21)	(31.9)	(.21)
8	297.7	5.02	381.0	6.81	464.3	8.59	547.5	10.37	630.8	12.15
	(38.3)	(.25)	(34.1)	(.22)	(32.0)	(.21)	(32.3)	(.21)	(35.1)	(.23)
9	342.0	5.97	447.3	8.23	552.7	10.48	658.1	12.73	763.5	14.99
	(35.8)	(.23)	(32.2)	(.21)	(32.4)	(.21)	(36.5)	(.24)	(43.4)	(.28)
10	391.4	7.03	521.5	9.81	651.6	12.60	781.7	15.38	911.8	18.16
	(33.7)	(.22)	(31.9)	(.21)	(36.2)	(.23)	(44.7)	(.29)	(55.6)	(.36)
11	446.0	8.20	603.5	11.57	760.9	14.93	918.3	18.30	1,075.7	21.67
	(32.2)	(.21)	(34.0)	(.22)	(43.2)	(.28)	(56.2)	(.36)	(71.1)	(.46)
12	505.9	9.48	693.2	13.49	880.6	17.49	1,067.9	21.50	1,255.3	25.51
	(31.8)	(.21)	(38.6)	(.25)	(52.9)	(.34)	(70.3)	(.45)	(89.0)	(.57)
13	570.9	10.87	790.8	15.57	1,010.7	20.28	1,230.5	24.98	1,450.4	29.69
	(32.9)	(.21)	(45.4)	(.29)	(64.8)	(.42)	(86.5)	(.56)	(109.2)	(.70)
14	641.2	12.37	896.2	17.83	1,151.2	23.28	1,406.2	28.74	1,661.2	34.20
	(35.6)	(.23)	(54.2)	(.35)	(78.5)	(.51)	(104.6)	(.67)	(131.4)	(.85)
15	716.7	13.99	1,009.4	20.25	1,302.1	26.51	1,594.8	32.78	1,887.6	39.04
	(40.1)	(.26)	(64.7)	(.42)	(93.8)	(.60)	(124.3)	(.80)	(155.4)	(1.00)
16	797.3	15.71	1,130.4	22.84	1,463.4	29.97	1,796.5	38.09	2,129.5	44.22
	(45.9)	(.30)	(76.4)	(.49)	(110.5)	(.71)	(145.7)	(.94)	(181.4)	(1.17)
17	883.2	17.55	1,259.2	25.59	1,635.2	33.64	2,011.1	41.68	2,387.1	49.73
	(53.1)	(.34)	(89.4)	(.58)	(128.6)	(.83)	(168.7)	(1.09)	(209.1)	(1.35)
18	974.2	19.50	1,395.8	28.52	1,817.3	37.54	2,238.8	46.56	2,660.3	55.57
	(61.4)	(.40)	(103.5)	(.67)	(147.9)	(.95)	(193.1)	(1.24)	(238.6)	(1.54)

[1]The numbers in parentheses give a confidence interval on the mean.

Table 8.—*Red pine bole weight and bole volumes (95 percent confidence limits on the mean)*

	Bole length (feet)									
	30		40		50		60		70	
D.b.h.	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume
Inches	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*
5	177.4	3.35	220.5	4.07	263.6	4.79	306.7	5.51	349.8	6.23
	(12.4)[1]	(.20)	(11.6)	(.19)	(10.8)	(.18)	(10.1)	(.17)	(9.5)	(.16)
6	234.3	4.30	296.3	5.34	358.4	6.37	420.4	7.41	482.4	8.44
	(11.3)	(.19)	(10.3)	(.17)	(9.4)	(.16)	(8.8)	(.15)	(8.4)	(.14)
7	301.5	5.42	385.9	6.83	470.4	8.24	554.8	9.65	639.2	11.06
	(10.2)	(.17)	(9.1)	(.15)	(8.4)	(.14)	(8.3)	(.14)	(8.8)	(.15)
8	379.0	6.72	489.3	8.55	599.6	10.40	709.9	12.24	820.1	14.08
	(9.2)	(.15)	(8.4)	(.13)	(8.5)	(.14)	(9.5)	(.16)	(11.3)	(.19)
9	466.9	8.18	606.5	10.51	746.0	12.84	885.6	15.17	1,025.2	17.50
	(8.4)	(.14)	(8.5)	(.14)	(10.1)	(.17)	(12.5)	(.21)	(15.4)	(.26)
10	565.1	9.82	737.4	12.70	909.7	15.58	1,082.0	18.45	1,254.3	21.33
	(8.3)	(.14)	(9.9)	(.17)	(13.0)	(.22)	(16.7)	(.28)	(20.7)	(.35)
11	673.7	11.64	882.2	15.12	1,090.6	18.60	1,299.1	22.08	1,507.6	25.56
	(9.1)	(.15)	(12.4)	(.21)	(16.9)	(.28)	(21.8)	(.36)	(27.0)	(.45)
12	792.6	13.62	1,040.7	17.76	1,288.8	21.90	1,536.9	26.05	1,785.0	30.19
	(10.8)	(.18)	(15.8)	(.26)	(21.6)	(.36)	(27.7)	(.46)	(33.9)	(.57)
13	921.8	15.78	1,213.0	20.64	1,504.2	25.50	1,795.4	30.36	2,086.5	35.22
	(13.2)	(.22)	(19.8)	(.33)	(26.9)	(.45)	(34.2)	(.57)	(41.7)	(.69)
14	1,061.4	18.11	1,399.1	23.74	1,736.8	29.38	2,074.5	35.02	2,412.2	40.66
	(16.2)	(.27)	(24.3)	(.40)	(32.7)	(.55)	(41.3)	(.69)	(50.0)	(.83)
15	1,211.3	20.61	1,598.9	27.08	1,986.6	33.55	2,374.3	40.02	2,762.0	46.50
	(19.7)	(.33)	(29.2)	(.49)	(39.1)	(.65)	(49.1)	(.82)	(59.1)	(.98)
16	1,371.5	23.28	1,812.6	30.65	2,253.7	38.01	2,694.8	45.37	3,135.8	52.74
	(23.6)	(.39)	(34.6)	(.58)	(46.0)	(.77)	(57.4)	(.96)	(68.8)	(1.15)
17	1,542.1	26.13	2,040.0	34.44	2,538.0	42.76	3,035.9	51.07	3,533.9	59.38
	(27.8)	(.46)	(40.5)	(.67)	(53.3)	(.89)	(66.2)	(1.10)	(79.2)	(1.32)
18	1,723.0	29.15	2,281.2	38.47	2,839.5	47.79	3,397.7	57.11	3,956.0	66.43
	(32.4)	(.54)	(46.7)	(.78)	(61.1)	(1.02)	(75.6)	(1.26)	(90.2)	(1.50)

[1]The numbers in parentheses give a confidence interval on the mean.

Table 9.—*Balsam fir bole weight and bole volume (95 percent confidence limits on the mean)*

D.b.h.	Bole length (feet) 20		30		40		50		60	
	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume
Inches	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*
5	144.6	2.65	180.5	3.35	216.5	4.06	252.4	4.76	288.4	5.45
	(29.3)[1]	(.24)	(27.1)	(.22)	(25.0)	(.20)	(23.2)	(.19)	(21.7)	(.18)
6	176.2	3.27	228.0	4.28	279.8	5.29	331.5	6.30	383.3	7.31
	(27.3)	(.22)	(24.4)	(.20)	(22.0)	(.18)	(20.5)	(.17)	(19.9)	(.16)
7	213.6	4.00	284.1	5.37	354.5	6.75	425.0	8.12	495.5	9.50
	(25.2)	(.20)	(21.9)	(.18)	(20.1)	(.16)	(20.1)	(.16)	(22.0)	(.18)
8	256.8	4.84	348.8	6.64	440.8	8.43	532.9	10.23	624.9	12.02
	(23.0)	(.19)	(20.2)	(.16)	(20.4)	(.16)	(23.6)	(.19)	(28.8)	(.23)
9	305.6	5.79	422.1	8.07	538.6	10.34	655.1	12.61	771.6	14.88
	(21.2)	(.17)	(20.1)	(.16)	(23.9)	(.19)	(30.8)	(.25)	(39.2)	(.32)
10	360.3	6.86	504.1	9.67	647.9	12.47	791.7	15.28	935.5	18.08
	(20.0)	(.16)	(22.3)	(.18)	(30.3)	(.25)	(40.8)	(.33)	(52.3)	(.42)
11	420.7	8.04	594.7	11.43	768.7	14.83	942.7	18.22	1,116.7	21.61
	(20.1)	(.16)	(27.0)	(.22)	(39.0)	(.32)	(52.9)	(.43)	(67.4)	(.54)
12	486.8	9.33	693.9	13.37	901.0	17.41	1,108.1	21.45	1,315.1	25.49
	(21.7)	(.18)	(33.5)	(.27)	(49.5)	(.40)	(66.6)	(.54)	(84.3)	(.68)
13	558.7	10.73	801.8	15.47	1,044.8	20.21	1,287.8	24.95	1,530.8	29.69
	(24.9)	(.20)	(41.6)	(.34)	(61.3)	(.50)	(81.9)	(.66)	(102.9)	(.83)
14	636.4	12.25	918.2	17.74	1,200.1	23.24	1,481.9	28.74	1,763.8	34.24
	(29.6)	(.24)	(50.9)	(.41)	(74.4)	(.60)	(98.7)	(.80)	(123.2)	(.99)
15	719.8	13.87	1,043.3	20.18	1,366.9	26.50	1,690.4	32.81	2,014.0	39.12
	(35.4)	(.29)	(61.2)	(.49)	(88.7)	(.72)	(116.8)	(.94)	(145.0)	(1.17)
16	808.9	15.61	1,177.1	22.79	1,545.2	29.97	1,913.3	37.15	2,281.5	44.33
	(42.1)	(.34)	(72.5)	(.59)	(104.1)	(.84)	(136.2)	(1.10)	(168.5)	(1.36)
17	903.9	17.46	1,319.4	25.57	1,735.0	33.68	2,150.6	41.78	2,566.2	49.89
	(49.7)	(.40)	(84.6)	(.68)	(120.7)	(.97)	(157.0)	(1.27)	(193.5)	(1.56)
18	1,004.5	19.43	1,470.4	28.51	1,936.3	37.60	2,402.3	46.69	2,868.2	55.78
	(58.0)	(.47)	(97.7)	(.79)	(138.2)	(1.12)	(179.1)	(1.45)	(220.1)	(1.78)

[1]The numbers in parentheses give a confidence interval on the mean.

Table 10.—Sugar maple bole weight and bole volume (95 percent confidence intervals on the mean)

	Bole length (feet)											
	10		20		30		40		50		60	
D.b.h.	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume
Inches	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*
5	90.7	1.36	136.7	2.18	182.6	2.99	228.6	3.81	274.5	4.62	320.5	5.44
	(7.8)[1]	(.13)	(7.2)	(.12)	(6.7)	(.11)	(6.4)	(.11)	(6.5)	(.11)	(6.8)	(.12)
6	111.0	1.72	177.1	2.89	243.3	4.07	309.5	5.24	375.6	6.41	441.8	7.59
	(7.5)	(.13)	(6.7)	(.11)	(6.4)	(.11)	(6.7)	(.11)	(7.5)	(.13)	(8.6)	(.15)
7	134.9	2.14	224.9	3.74	315.0	5.34	405.0	6.94	495.1	8.53	585.2	10.13
	(7.2)	(.12)	(6.5)	(.11)	(6.8)	(.11)	(7.9)	(.14)	(9.7)	(.16)	(11.8)	(.20)
8	162.4	2.63	280.1	4.72	397.7	6.81	515.3	8.90	633.0	10.98	750.6	13.06
	(6.9)	(.11)	(6.5)	(.11)	(7.8)	(.13)	(10.1)	(.18)	(13.0)	(.22)	(16.0)	(.27)
9	193.7	3.19	342.6	5.83	491.4	8.47	640.3	11.11	789.2	13.76	938.1	16.39
	(6.6)	(.11)	(7.0)	(.12)	(9.6)	(.16)	(13.1)	(.22)	(17.0)	(.29)	(21.0)	(.36)
10	228.6	3.81	412.4	7.07	596.2	10.33	780.0	13.59	963.8	16.86	1,147.6	20.12
	(6.5)	(.11)	(8.1)	(.14)	(12.0)	(.20)	(16.8)	(.28)	(21.8)	(.37)	(26.9)	(.46)
11	267.2	4.49	489.6	8.44	712.0	12.39	934.4	16.33	1,156.8	20.28	1,379.2	24.23
	(6.5)	(.11)	(9.6)	(.16)	(15.0)	(.26)	(21.0)	(.35)	(27.2)	(.46)	(33.4)	(.57)
12	309.5	5.24	574.1	9.94	838.8	14.63	1,103.5	19.32	1,368.2	24.02	1,632.8	28.71
	(6.7)	(.11)	(11.5)	(.20)	(18.3)	(.31)	(25.6)	(.43)	(33.1)	(.56)	(40.6)	(.69)
13	355.4	6.06	666.0	11.57	976.7	17.07	1,287.3	22.58	1,597.9	28.09	1,908.5	33.60
	(7.2)	(.12)	(13.8)	(.23)	(22.1)	(.38)	(30.8)	(.52)	(39.6)	(.67)	(48.5)	(.82)
14	405.0	6.94	765.3	13.33	1,125.5	19.72	1,485.8	26.10	1,846.0	32.49	2,206.3	38.88
	(7.9)	(.13)	(16.4)	(.28)	(26.3)	(.45)	(36.4)	(.62)	(46.7)	(.79)	(57.0)	(.97)
15	458.3	7.88	871.9	15.22	1,285.4	22.56	1,699.0	29.89	2,112.5	37.22	2,526.1	44.56
	(8.9)	(.15)	(19.2)	(.33)	(30.8)	(.52)	(42.5)	(.72)	(54.3)	(.92)	(66.2)	(1.12)
16	515.3	8.89	985.8	17.24	1,456.4	25.58	1,926.9	33.93	2,397.4	42.27	2,868.0	50.62
	(10.1)	(.17)	(22.4)	(.38)	(35.6)	(.60)	(49.0)	(.83)	(62.5)	(1.06)	(76.1)	(1.29)
17	576.0	9.97	1,107.2	19.39	1,638.3	28.81	2,169.5	38.23	2,700.7	47.65	3,231.9	57.07
	(11.5)	(.20)	(25.7)	(.44)	(40.8)	(.69)	(56.0)	(.95)	(71.3)	(1.21)	(86.5)	(1.47)
18	640.3	11.11	1,235.8	21.67	1,831.3	32.23	2,426.8	42.80	3,022.4	53.36	3,617.9	63.92
	(13.1)	(.22)	(29.4)	(.50)	(46.3)	(.78)	(63.4)	(1.07)	(80.5)	(1.36)	(97.7)	(1.65)

[1]The numbers in parentheses give a confidence interval on the mean.

Table 11.—*Residue weight and volume (95 percent confidence limit on the mean)*

D.b.h.	Aspen		White spruce		Red pine		Balsam fir		Sugar maple pulpwood	
	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume	Weight	Volume
Inches	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*	*Pounds*	*Feet³*
5	38.2	0.99	65.0	0.93	26.5	0.51	89.8	1.77	103.2	1.77
	(17.3)[1]	(.37)	(49.0)	(1.01)	(9.0)	(.16)	(32.9)	(.72)	(12.9)	(.27)
6	63.2	1.47	101.0	1.68	48.5	0.87	119.9	2.37	130.8	2.27
	(14.9)	(.32)	(42.5)	(.87)	(7.4)	(.13)	(27.6)	(.60)	(9.9)	(.22)
7	92.9	2.04	143.5	2.58	74.4	1.31	155.3	3.07	163.5	2.85
	(12.9)	(.28)	(36.2)	(.74)	(6.2)	(.11)	(22.8)	(.50)	(9.8)	(.23)
8	127.1	2.69	192.5	3.61	104.3	1.81	196.3	3.88	201.2	3.53
	(12.4)	(.27)	(31.6)	(.65)	(6.4)	(.11)	(20.8)	(.45)	(13.3)	(.31)
9	165.8	3.43	248.1	4.79	138.1	2.37	242.7	4.79	243.9	4.30
	(14.3)	(.31)	(31.4)	(.65)	(8.4)	(.15)	(24.3)	(.53)	(19.5)	(.45)
10	209.1	4.25	310.3	6.10	176.0	3.01	294.6	5.82	291.6	5.26
	(18.4)	(.39)	(37.4)	(.77)	(11.8)	(.21)	(32.8)	(.72)	(27.3)	(.62)
11	257.0	5.17	378.9	7.54	217.9	3.71	351.9	6.95	344.4	6.10
	(24.3)	(.52)	(48.8)	(1.00)	(16.0)	(.28)	(44.8)	(.98)	(36.2)	(.82)
12	309.4	6.17	454.1	9.13	263.7	4.48	414.7	8.19	402.2	7.14
	(31.3)	(.67)	(64.0)	(1.32)	(20.8)	(.37)	(59.0)	(1.29)	(46.3)	(1.05)
13	366.4	7.26	535.9	10.85	313.5	5.31	482.9	9.54	465.0	8.27
	(39.4)	(.84)	(81.9)	(1.68)	(26.2)	(.46)	(75.1)	(1.64)	(57.3)	(1.29)
14	427.9	8.43	624.2	12.71	367.3	6.21	556.7	10.99	532.9	9.49
	(48.3)	(1.03)	(102.0)	(2.10)	(32.1)	(.57)	(92.9)	(2.02)	(69.2)	(1.56)
15	494.0	9.69	719.0	14.71	425.1	7.18	635.8	12.55	605.8	10.80
	(58.0)	(1.24)	(124.1)	(2.55)	(38.4)	(.68)	(112.1)	(2.44)	(82.1)	(1.84)
16	564.6	11.04	820.4	16.85	486.9	8.21	720.5	14.23	683.7	12.20
	(68.4)	(1.46)	(148.0)	(3.04)	(45.3)	(.80)	(132.8)	(2.90)	(95.9)	(2.15)
17	639.9	12.48	928.3	19.12	552.7	9.31	810.5	16.00	766.6	13.69
	(79.6)	(1.70)	(173.6)	(3.57)	(52.6)	(.93)	(155.0)	(3.38)	(110.7)	(2.47)
18	719.6	14.00	1,042.7	21.53	622.4	10.48	906.1	17.89	854.6	15.27
	(91.5)	(1.96)	(200.9)	(4.13)	(60.4)	(1.07)	(178.5)	(3.89)	(126.3)	(2.82)

[1]The numbers in parentheses give a confidence interval on the mean.

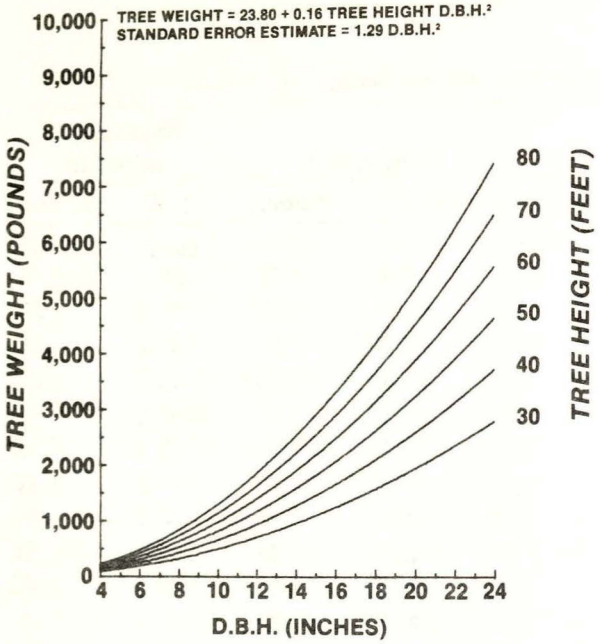

Figure 1.— *Tree weight— aspen.*

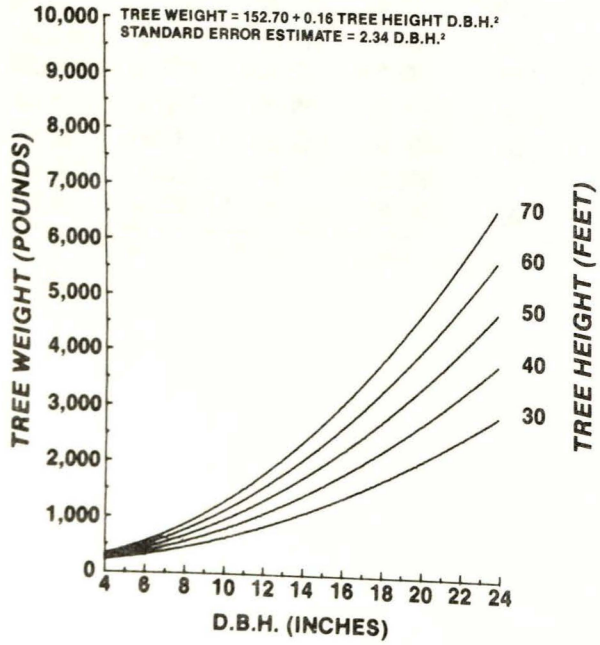

Figure 2.— Tree weight— white spruce.

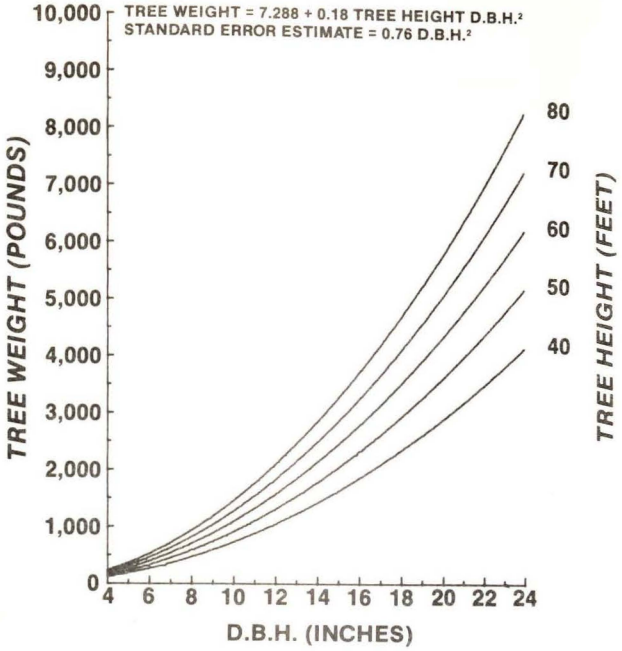

Figure 3.— Tree weight— red pine.

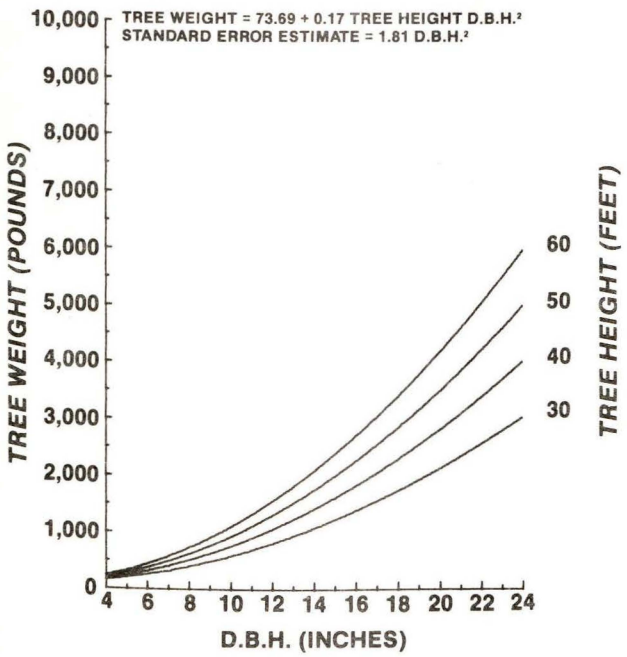

Figure 4.— Tree weight— balsam fir.

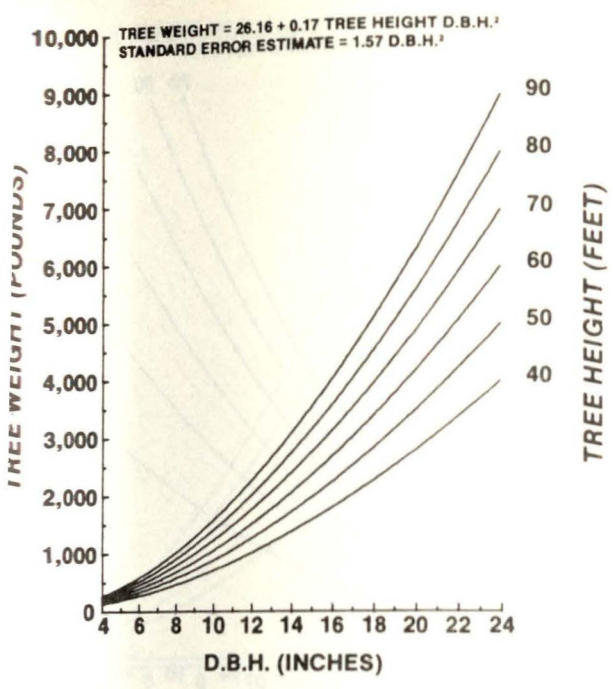

Figure 5.— Tree weight— maple.

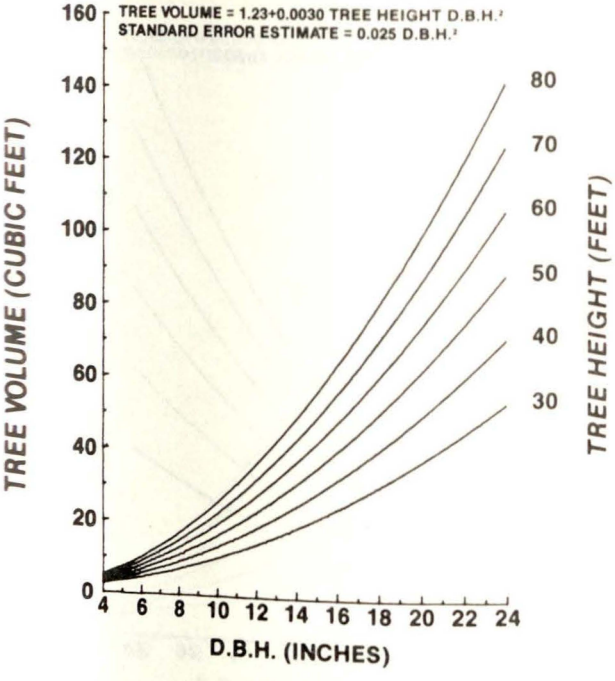

Figure 6.— Tree volume— aspen.

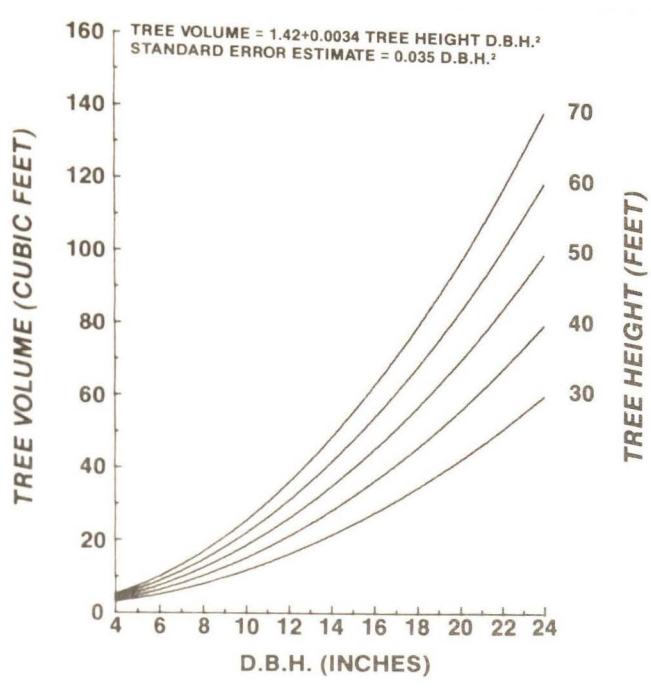

Figure 7.— Tree volume— white spruce.

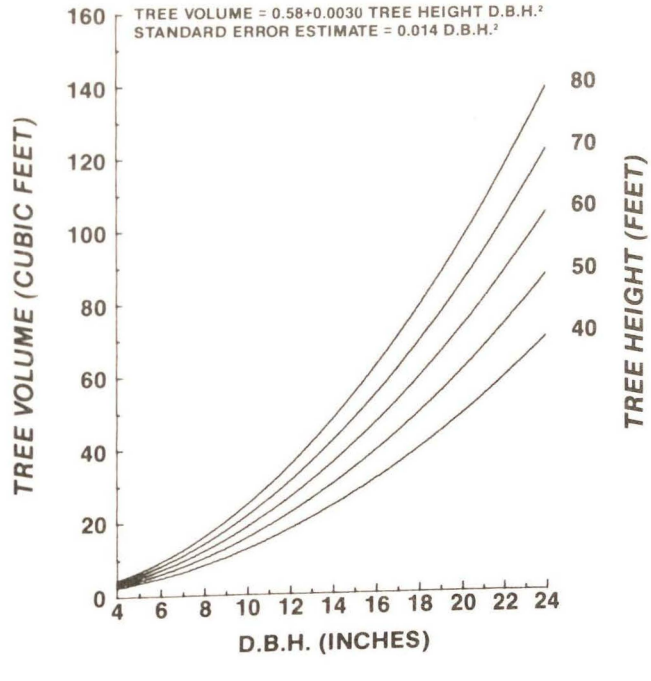

Figure 8.— Tree volume— red pine.

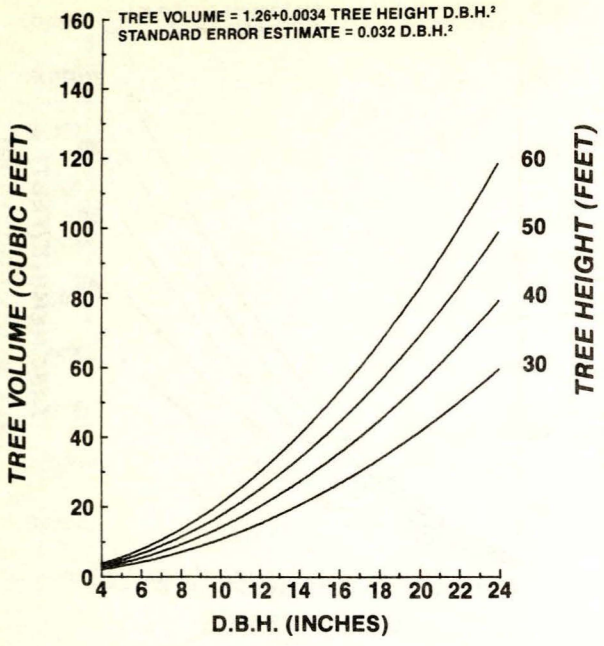
TREE VOLUME = 1.26+0.0034 TREE HEIGHT D.B.H.²
STANDARD ERROR ESTIMATE = 0.032 D.B.H.²
TREE VOLUME (CUBIC FEET)
TREE HEIGHT (FEET)
D.B.H. (INCHES)

Figure 9.— Tree volume— balsam fir.

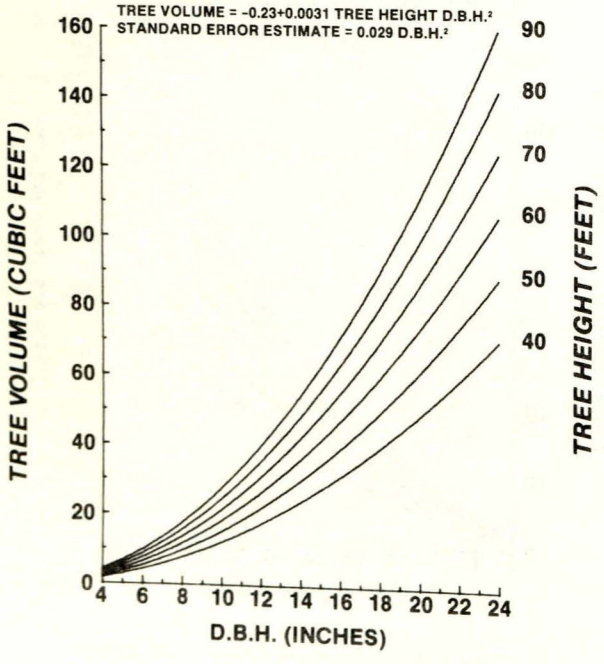
TREE VOLUME = -0.23+0.0031 TREE HEIGHT D.B.H.²
STANDARD ERROR ESTIMATE = 0.029 D.B.H.²
TREE VOLUME (CUBIC FEET)
TREE HEIGHT (FEET)
D.B.H. (INCHES)

Figure 10.— Tree volume— maple.

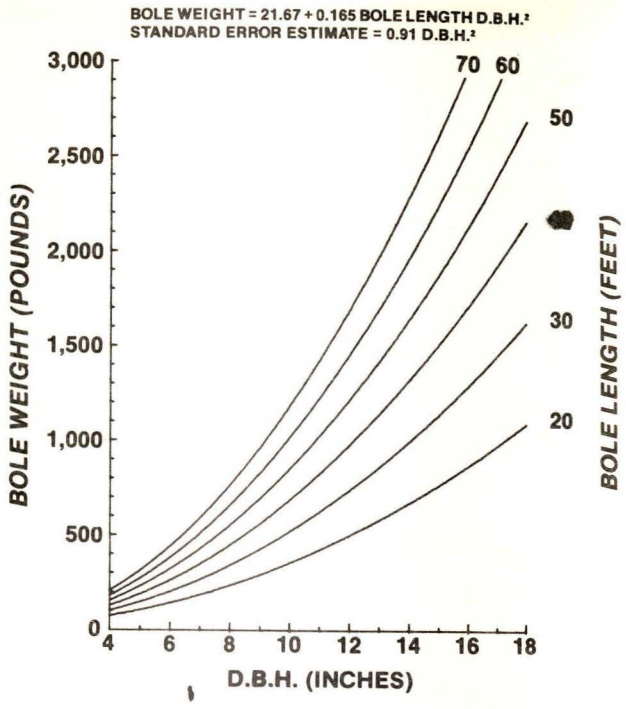

Figure 11.— Bole weight— aspen.

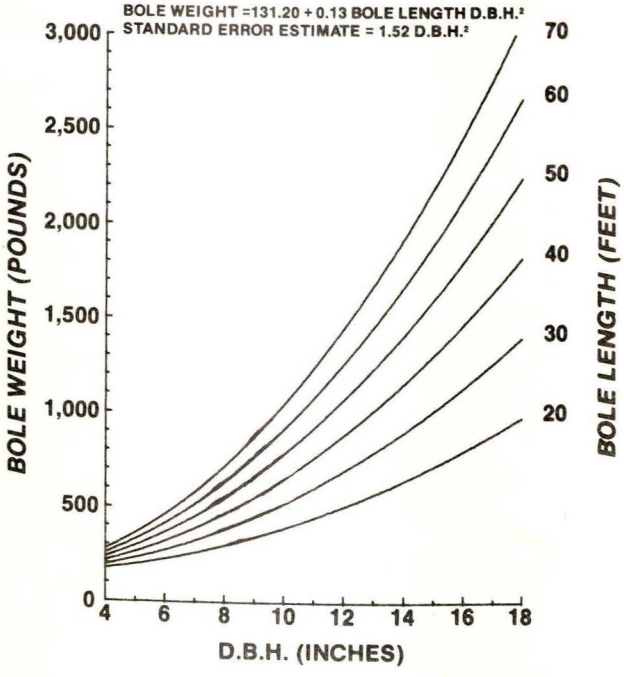

Figure 12.— Bole weight— white spruce.

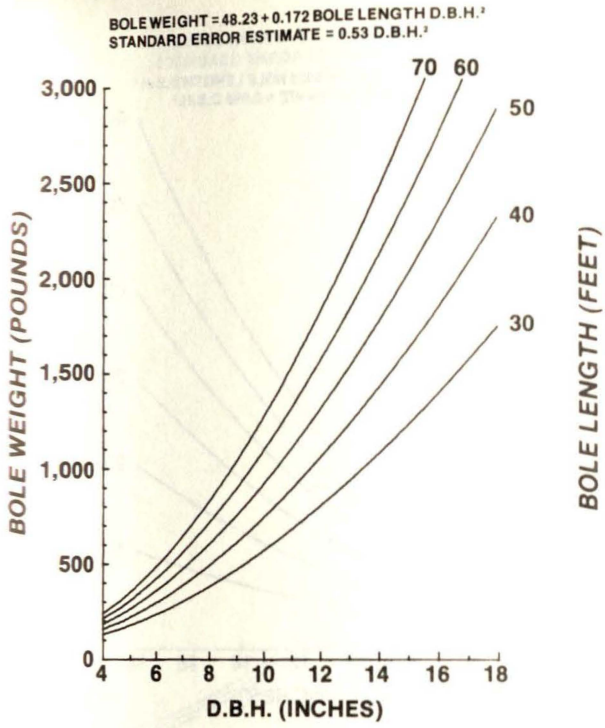

Figure 13.— Bole weight— red pine.

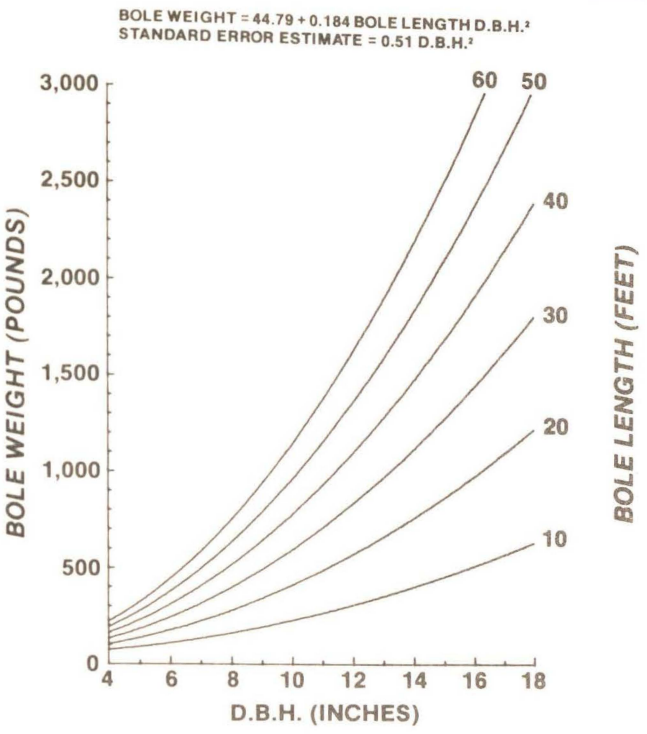

Figure 15.— Bole weight— maple.

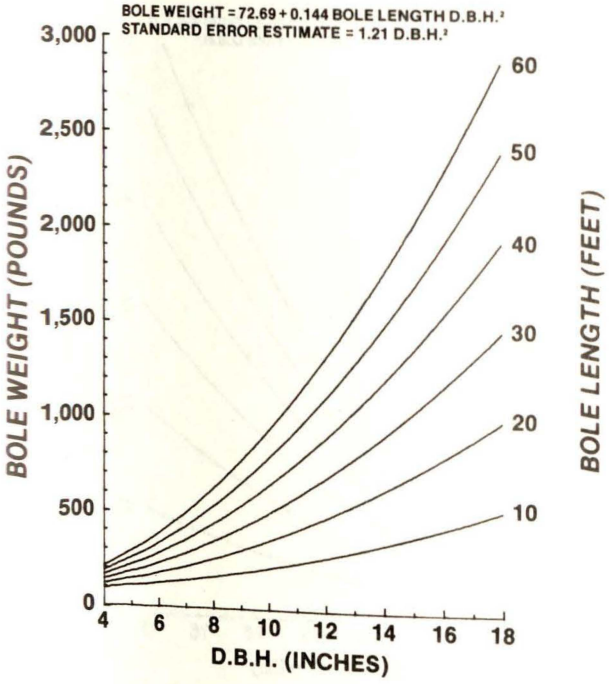

Figure 14.— Bole weight— balsam fir.

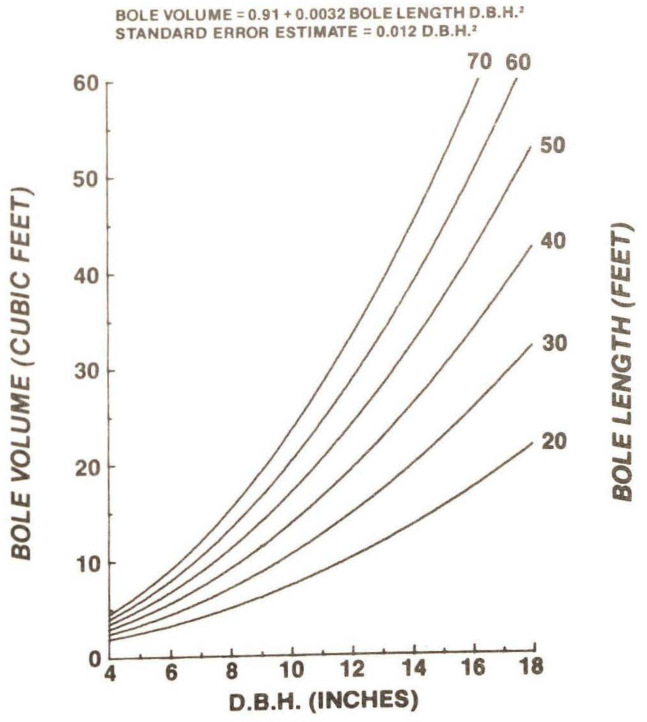

Figure 16.— Bole volume— aspen.

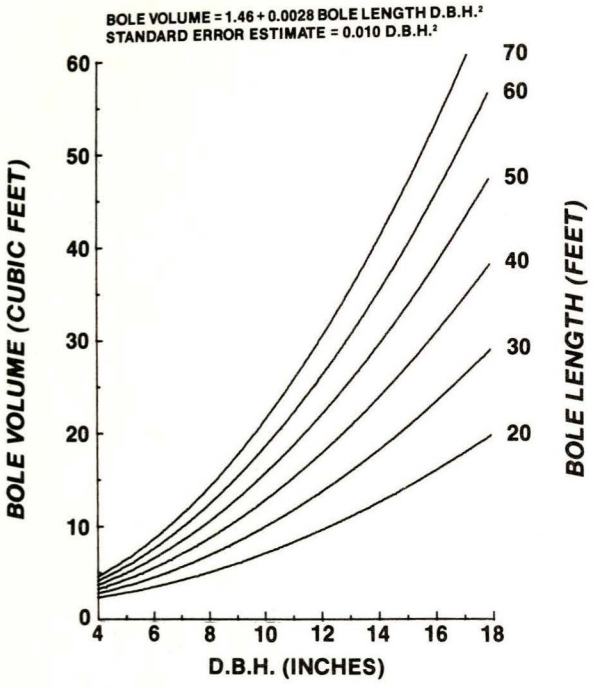

Figure 17.— Bole volume— white spruce.

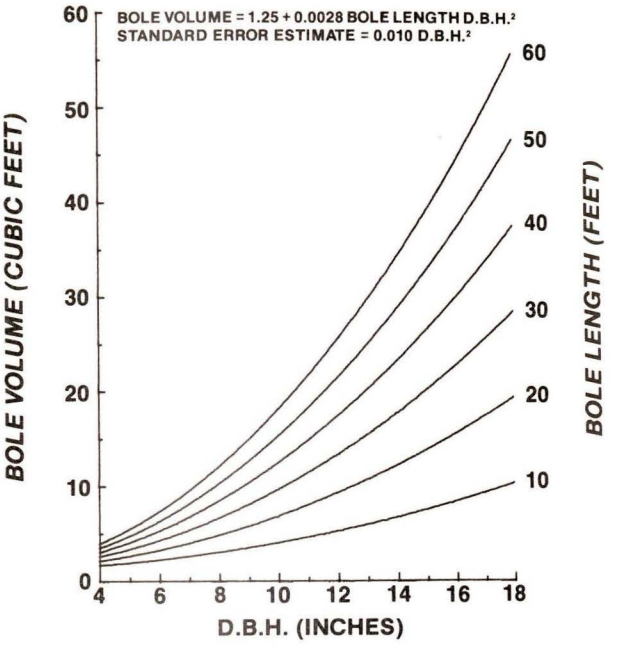

Figure 19.— Bole volume— balsam fir.

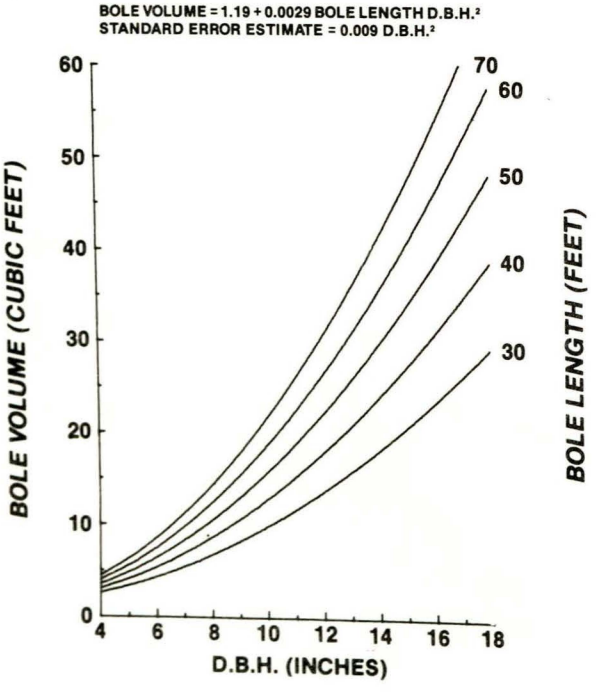

Figure 18.— Bole volume— red pine.

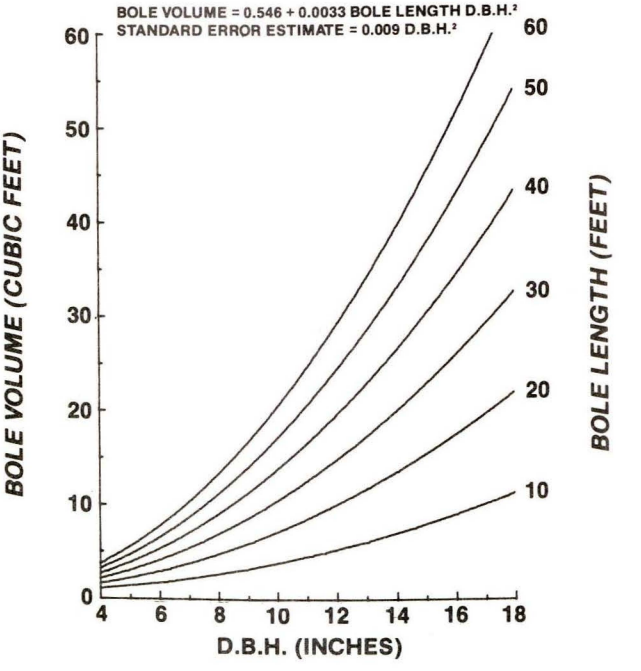

Figure 20.— Bole volume— maple.

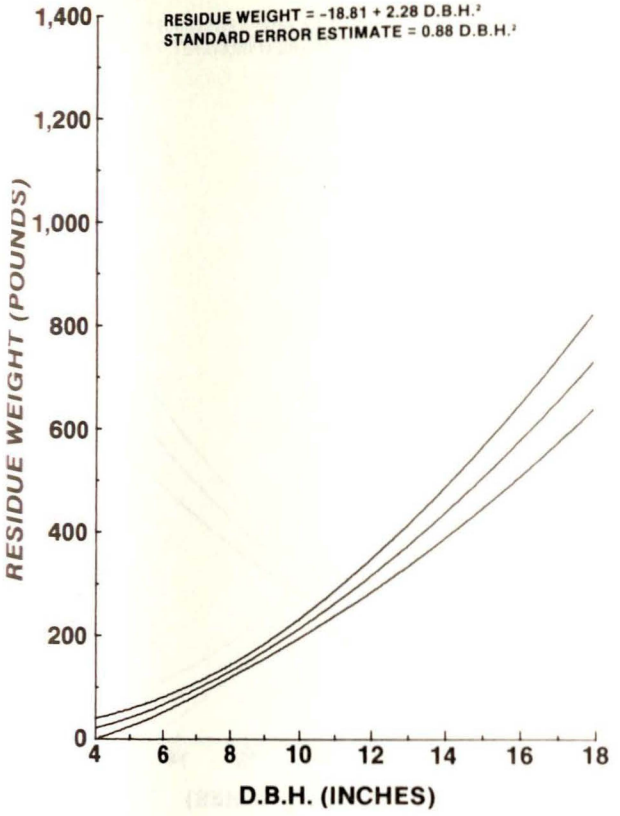

Figure 21.— Aspen residue weight with 95 percent confidence limits on the mean.

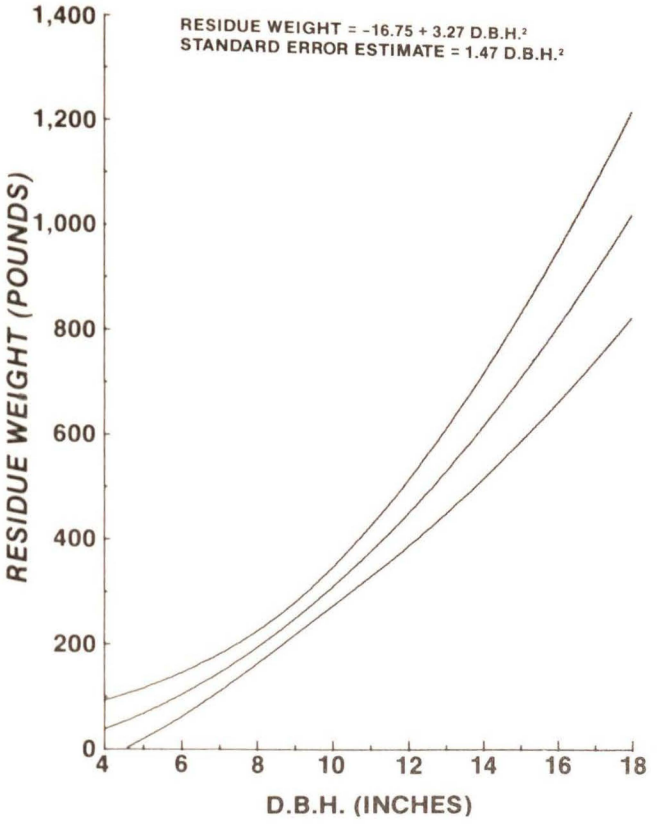

Figure 22.— White spruce residue weight with 95 percent confidence limits on the mean.

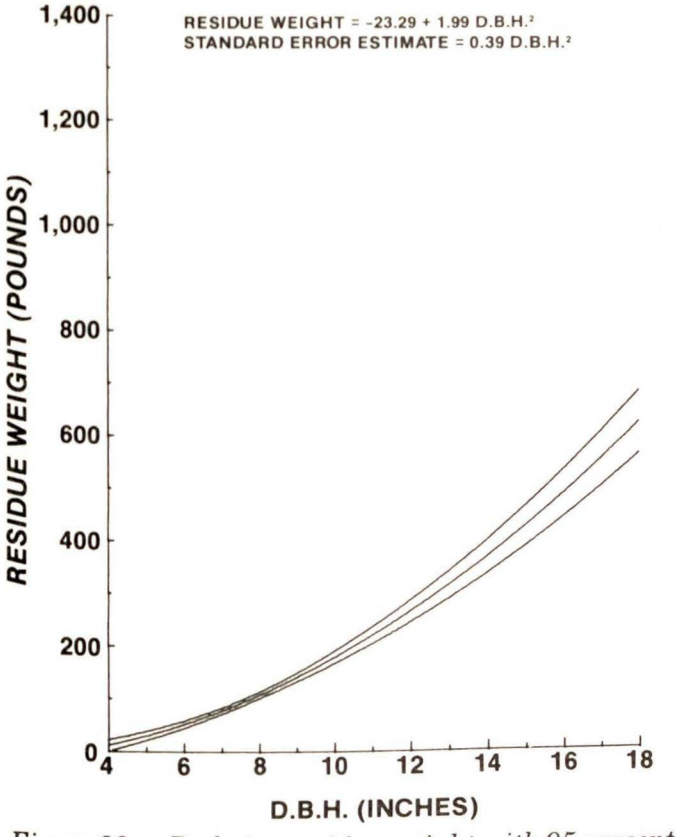

Figure 23.— Red pine residue weight with 95 percent confidence limits on the mean.

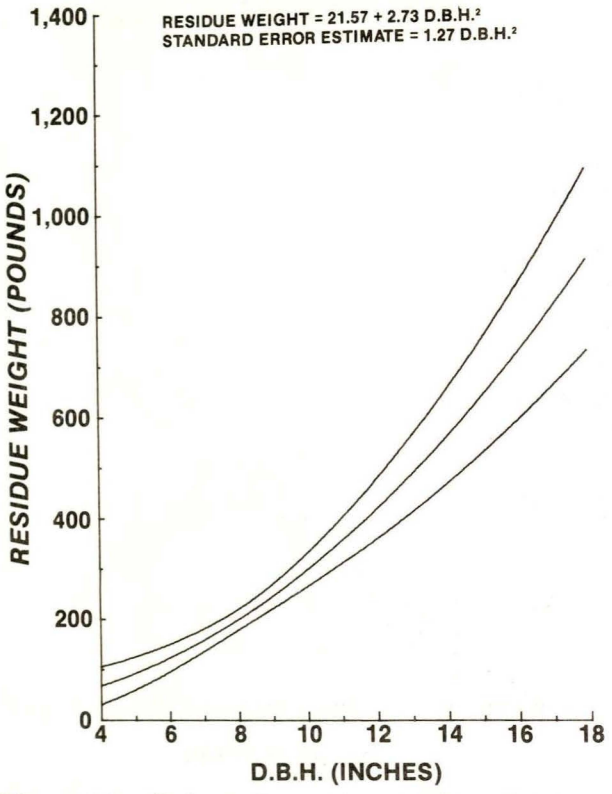

Figure 24.— Balsam fir residue weight with 95 percent confidence limits on the mean.

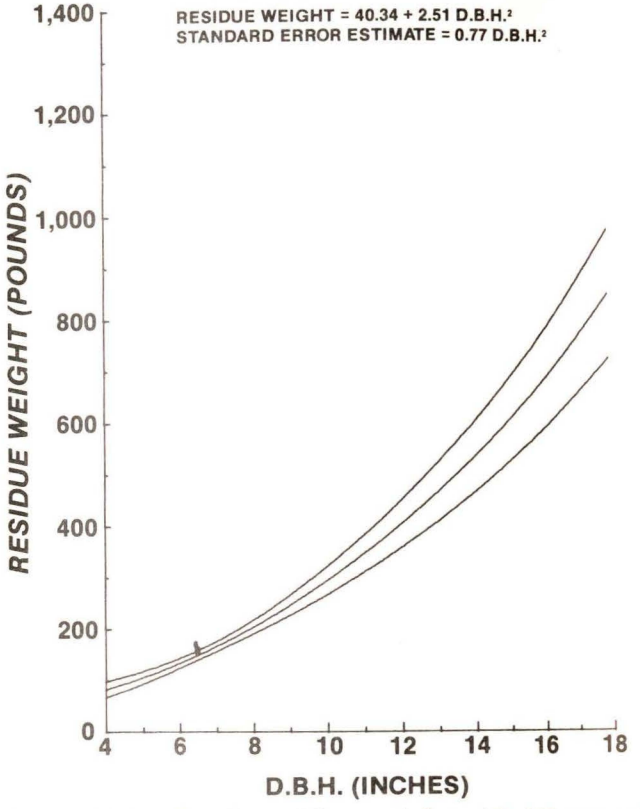

Figure 25.— Maple residue weight with 95 percent confidence limits on the mean.

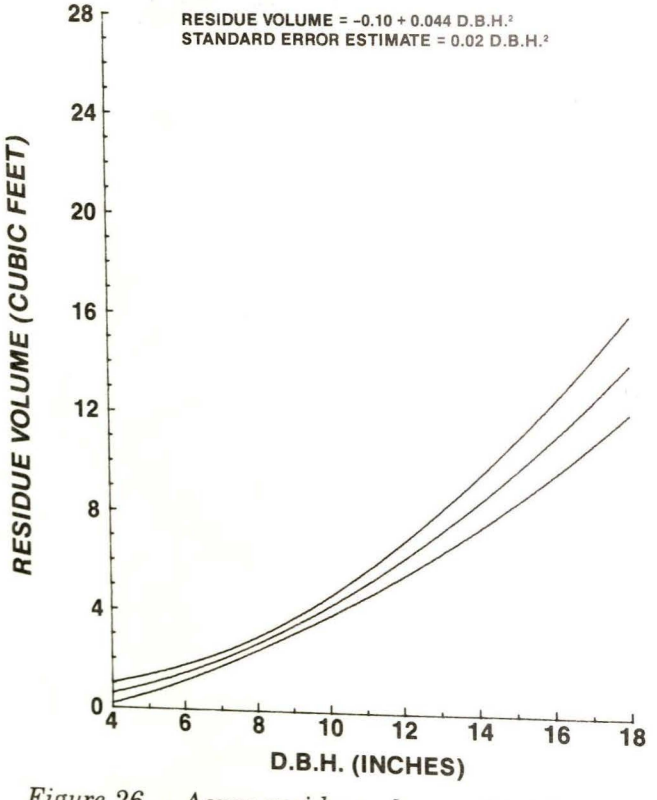

Figure 26.— Aspen residue volume with 95 percent confidence limits on the mean.

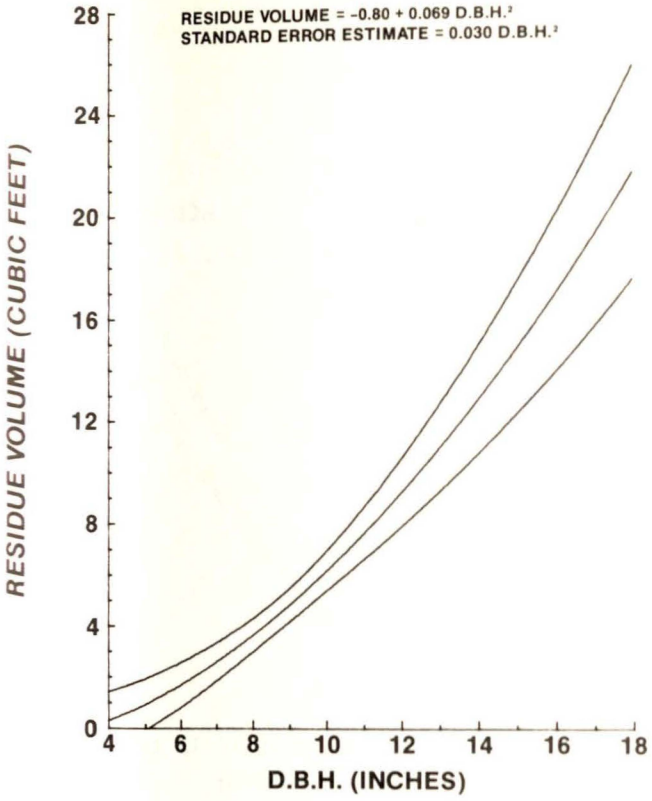

Figure 27.— White spruce residue volume with 95 percent confidence limits on the mean.

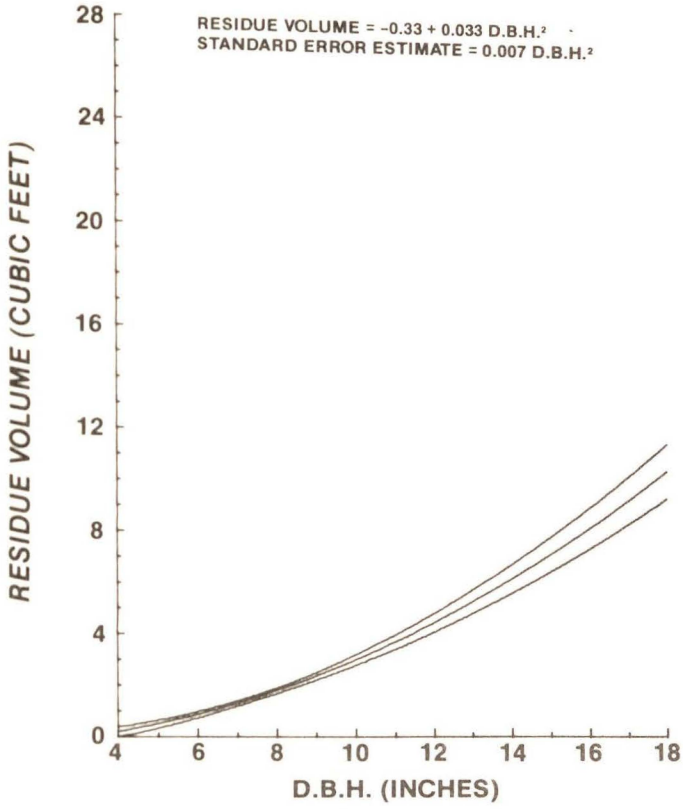

Figure 28.— Red pine residue volume with 95 percent confidence limits on the mean.

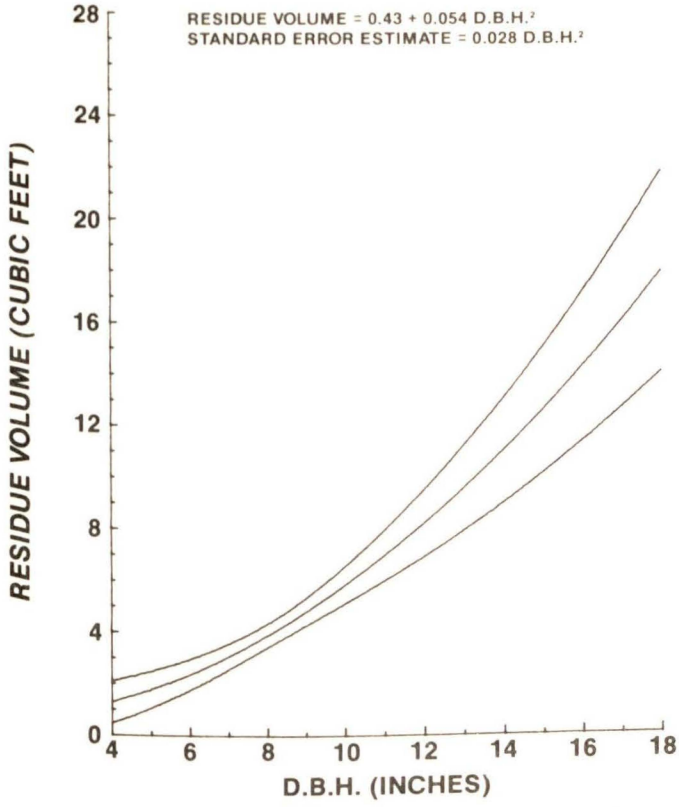

Figure 29.— Balsam fir residue volume with 95 percent confidence limits on the mean.

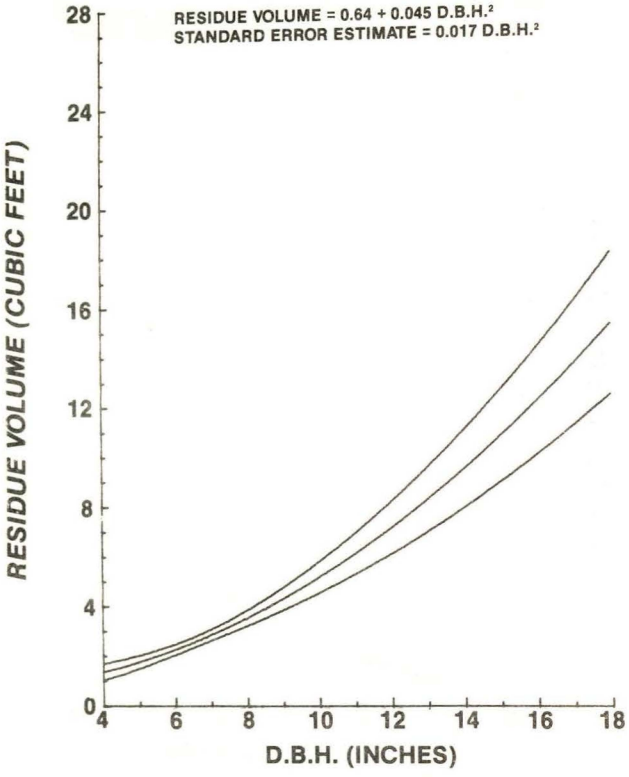

Figure 30.— Maple residue volume with 95 percent confidence limits on the mean.

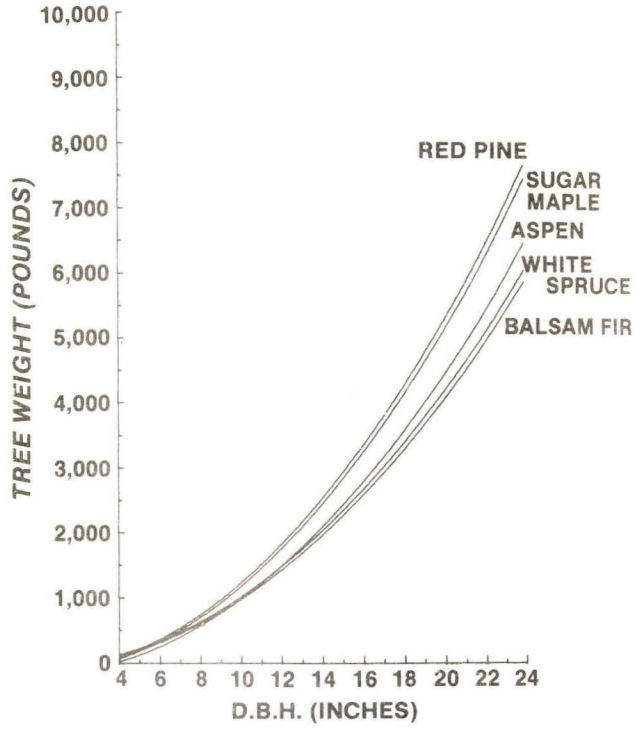

Figure 31.— Tree weight based on d.b.h.— 5 species.

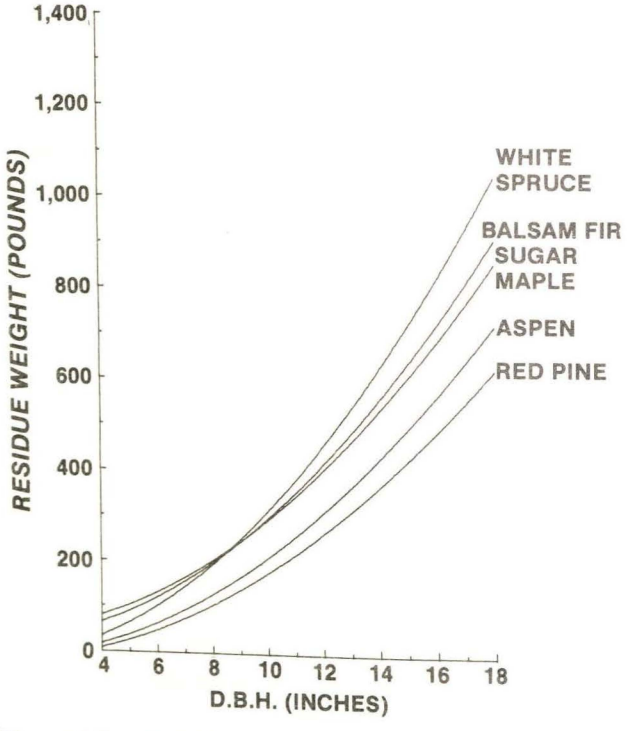

Figure 32.— Residue weight based on d.b.h.— 5 species.

☆ U.S.GPO:1981-766-506/134-6

Winsauer, Sharon A., and Helmuth M. Steinhilb.

1980. Summary of green weights and volumes for five tree species in Michigan. U.S. Department of Agriculture Forest Service, Research Paper NC-191, 22 p., U.S. Department of Agriculture Forest Service, North Central Forest Experiment Station, St. Paul, Minnesota.

Presents and summarizes the green weights and volumes of trees, boles and residue for sugar maple, white spruce, aspen, balsam fir and red pine in Northern Michigan. Equations, tables and graphs are included for each of the five species.

KEY WORDS: Sugar maple, white spruce, aspen, balsam fir, red pine, tree, bole, residue.